

after a fruitless dive, the swordfish came close up and made a thrust at the calf, but received a blow from the whale's flukes across the back, which apparently paralysed it. It was killed and hauled on board the boat without difficulty, while the whale and calf went off towards Coromandel with splashings and plungings. The whale's blow had almost knocked off the back fin of the swordfish and heavily bruised the flesh around it. No threshers accompanied the swordfish.

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Dr. C. W. Andrews, F.R.S., F.Z.S., gave the following account of his visit to Christmas Island in 1908, and illustrated his remarks with lantern-slides:—

“Christmas Island in the Indian Ocean (S. lat.  $10^{\circ} 25'$ , E. long.  $105^{\circ} 42'$ ) lies some two hundred miles south of Java, which is the nearest land. It has an area of about forty square miles, and its highest point is 1200 feet above the sea-level. The island consists mainly of coral-limestones resting on a basis of volcanic rock interstratified with foraminiferal limestones; the whole surface is thickly covered with forest and jungle. The fauna and flora of this isolated spot have been the subjects of numerous papers, a list of which up to the year 1900 is given in the ‘Monograph of Christmas Island,’ a volume which contains a detailed account of the collections which were made by me during my former visit in the years 1897-8. Since that date the island has been visited by Messrs. Ridley and Hanitsch of Singapore, and the former has published an interesting account\* of the flora, to which he was able to make a considerable number of additions. Almost up to the date of my first visit the island had been uninhabited, and was only visited by ships on very rare occasions; but since then, owing to the quarrying and export of the valuable deposits of phosphate of lime, a considerable population has been imported, and many ships call either to bring stores or to ship cargoes. The consequence of this is that many animals and plants have been introduced from time to time, and it was for the purpose of investigating the effect of these introductions on the native flora and fauna that, at the suggestion of Sir John Murray, I revisited the island in the autumn of last year, remaining there about three months. The changes that have taken place are, as might be expected, chiefly noticeable in the immediate neighbourhood of the settlement and quarries, while the rest of the island, although traversed by roads in several directions, is practically unchanged. To this general statement there is, however, at least one important exception, and that is that the two species of native rats seem to have become totally extinct. At the time of my former visit these animals swarmed over the whole island, one, *Mus macleari*, being found practically every-

\* “The Botany of Christmas Island,” Straits Branch, Royal Asiatic Society Journal, June 1906, p. 121.

where; the other, *Mus natalitatis*, more adapted for burrowing, was for the most part confined to the higher ground. Last year, in spite of continual search, not a single specimen of either species could be found in any part of the island. This complete disappearance of two such common animals seems to have taken place within the last five or six years, and to have been the result of some epidemic disease, possibly caused by a trypanosome, introduced by the ship-rats. These are a variety of *Mus rattus*, and have been introduced in considerable numbers, though they do not seem to have spread to the remoter parts of the island at present, at least to any great extent. The disappearance therefore of the native forms cannot be due to direct competition with the intruders, but must be the result of disease, a conclusion supported by an observation made by the medical officer, Dr. McDougal, who told me that some five or six years ago he frequently saw individuals of the native species of rats crawling about the paths in the daytime, apparently in a dying condition. I hope that it will be possible to obtain information as to whether any trypanosome or other pathogenic organism occurs in the blood of the imported rats.

“Of the other native mammals the shrew (a variety of *Crocidura fuliginosa*) is probably also extinct, at least no specimen was either seen or heard during my visit. The large fruit-bat (*Pteropus natalis*) is more numerous than formerly, at least near the settlement, probably in consequence of the much larger number of fruit-trees now to be found there. Cats have been introduced, and are becoming numerous; in some cases they have taken to the woods, and occasionally cause great destruction among the poultry which are reared in large numbers.

“The native land-birds all seem to be as numerous as formerly. The large fruit-pigeon (*Carpophaga whartoni*), which is used for food, is protected during the breeding-season, and at other times the number killed is limited so far as possible. These birds have not yet acquired any fear of man, and allow themselves to be snared by hand as easily as ever. The frigate-birds do not nest in the neighbourhood of Flying Fish Cove in anything like such numbers as formerly, but are still very numerous elsewhere. The yellow tropic-bird (*Phaethon fulvus*) seems to have increased in numbers. No introduced bird has obtained any footing on the island.

“No changes of importance were noticed among the native Invertebrates; but the large *Scolopendra*, of which a very few individuals were noticed during my first visit, is now much more numerous. Probably many insects have been introduced, but until my collections have been fully worked out, nothing can be said on this point.

“A large number of plants have been introduced, and probably the clearing of the forest and cutting of roads will enable them to spread much more rapidly in the future than they have done in the past. Already the papaia and chillies have extended

